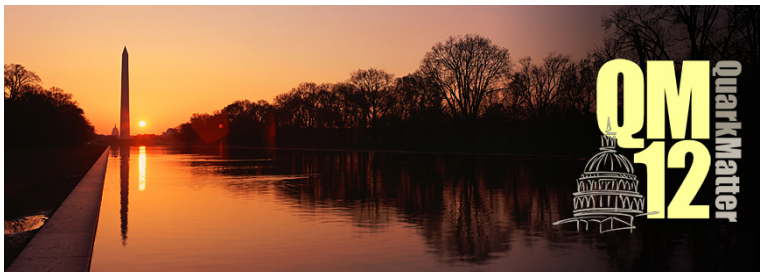

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Parton energy loss and modified beam quark distribution functions in Drell–Yan process in p +A collisions

Thursday 16 August 2012 16:00 (2 hours)

Within the framework of generalized collinear factorization in perturbative QCD (pQCD), we study the effect of initial multiple parton scattering and induced parton energy loss in Drell–Yan (DY) process in proton–nucleus collisions. We express the contribution from multiple parton scattering and induced radiative energy loss to the DY dilepton spectra in terms of nuclear modified effective beam (anti)quark distribution functions. The modification depends on the quark transport parameter in nuclear medium. This is similar to the final-state multiple parton scattering in deeply inelastic scattering (DIS) off large nuclei and leads to the suppression of the Drell–Yan cross section in p + A relative to p + p collisions. The modifications to (anti)quark distribution functions from (anti)quark-antiquark double scattering are shown to be determined by the (anti)quark distribution density in the medium. The asymmetry in quark and antiquark distributions in nuclei will lead to different modifications of quark and antiquark distribution functions inside the beam hardon. We also calculate DY spectra in p + A collisions and find the nuclear suppression due to beam parton energy loss negligible at the Fermilab energy Elab = 800 GeV in the kinematic region as covered by the E866 experiment. Most of the observed nuclear suppression of DY spectra in E866 experiment can be described well by parton shadowing in target nuclei as given by the EPS08 parameterization. The effect of beam parton energy loss, however, becomes significant for DY lepton pairs with large beam parton momentum fraction or small target parton momentum fraction.

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